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Taxonomic Review of Korean Sericinae (Coleoptera, Melolonthidae) II : Genus *Maladera* Mulsant

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Abstract A taxonomic study of the genus *Maladera* Mulsant of Korean Sericinae (Coleoptera, Melolonthidae) is presented. As a result, sixteen species are recognized including one new species, *Maladera coreana* sp. nov., and one subspecies, *Maladera castanea koreana* subsp. nov. A key, descriptions of the new species and subspecies, and photographs of aedeagus are provided.

Key words Taxonomy, *coreana* sp. nov., *castanea koreana* subsp. nov., Korea

INTRODUCTION

The species of this genus *Maladera* are typical oval shaped sericid beetles. They mostly feed on roots or humus in soft soil, and sometimes feed on leaves of shrubs. The ecological information of this genus is a few within some species (e.g., *M. orientalis*-Liu *et al.*, 1997) because of the small size and their minor ecological influence. This genus is mainly distributed in palaearctic, oriental, and ethiopian regions. There have been confusions of combination and separation of the genera *Maladera*, *Autoserica*, and *Aserica*, but we would treat all of these as *Maladera* established by Mulsant (1871) as Nomura (1973) and Kobayashii (1974). Since Kolbe (1886) first recorded two species (*M. orientalis* and *M. japonica*) from Korea, several faunistic researches including those by Okamoto (1924) and Murayama (1934-1954) were done on the fauna of *Maladera*. However, there are many problems such as misidentifications, synonyms and dubious names from the past reports. Some researchers reviewed this group (Murayama, 1954; Stebnicka, 1980; Kim and Lee, 1998; Kim, 2001), and latest Kim (2001) excluded some species names (*M. japonica, M. kamiyai, M. koreana, M. nitidiceps, M. secreta, M. thibetana, M. laboriosa* and *M. stridula*) from Korea. However, the study of this genus is still insufficient.

In this paper, Korean *Maladera* is fully revised: *M. formosae* is removed because of misidentification and *M. laboriosa* is reconfirmed based on Korean specimens. As a result, 16 species including *Maladera coreana* sp. nov. are recorded in the Korean peninsula. *M. castanea* in Korea has characteristics to consider as a subspecies, *M. castanea koreana* subsp. nov.. The detail is in the remark of *M. castanea koreana* subsp. nov.

Abbreviations are as follows: HB, Hamgyeongbuk-do; GW, Gangwon-do; GG, Gyeonggi-do; CB, Chungcheongbuk-do; CN, Chungcheongnam-do; GB, Gyeongsangbuk-do; GN, Gyeongsangnam-do; JB, Jeollabuk-do; JN, Jeollanam-do; JJ, Jeju-do; L, Body length; W,

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Width of elytra at base; TL, Type locality.

SYSTEMATIC ACCOUNTS

Genus *Maladera* Mulsant, 1871

Hist. Nat. Col. Fr.: 599 (Type species: *Scarabaeus holosericeus* Scopoli, 1772).

This genus has 9-10-segmented antenna with 3-segmented club. Elytra with upright hair, sometimes with setae. Interval between midcoxae mostly wider than the width of midfemur. Anterior base of hind femur sometimes serrated. Outer margin of hind tibia with 2-4 short hair groups vertically. Hind tarsus smooth without moles (Nomura 1973).

Distribution. Palaearctic, oriental, and ethiopian region.

Key to the Korean species of the genus *Maladera*

1. Body oval, metalic shining over dorsal surface. Abdominal segments and pygidium with dense hairs ..... *coreana* sp. nov.
- Body oval to eliptical, velvety or pearled shining over dorsal surface. Abdominal segments with scattered hairs 2
2. Clypeus without elevated vertical line in the middle; instead, convex or flat. Dorsal surface velvety (*except opaciventris*) 3
- Clypeus with elevated vertical line in the middle. Dorsal surface pearly shining 13
3. Hind tarsus with a row of hair on the inner side 4
- Hind tarsus without a row of hair on the inner side 6
4. Clypeus wider, narrowed anteriorly, shining and with low wrinkled moles ..... *renardi* (Ballion)
- Clypeus narrower, feebly narrowed anteriorly, weakly shining and with deep-wrinkled mole 5
5. Antennal club of male almost twice as long as stalk and curved. Hind femur slender and long. Outer spur of hind tibia shorter than the first segment of hind tarsus ..... *holosericea* (Scopoli)
- Antennal club of male 1/2 times longer than stalk and straight. Hind femur wider. Outer spur of hind tibia somewhat longer than the first segment of hind tarsus ..... *schoenfeldti* (Murayama)
6. 3rd and 4th abdominal segments elevated and stair shaped ..... *gibbiventris* (Brenske)
- Abdominal segments not elevated 7
7. Clypeus shiny, narrow, almost parallel, with low wrinkled moles. Spurs of male pretarsus differ in length ..... *okamotoi* (Murayama)
- Clypeus matted, narrowed anteriorly, with deep wrinkled mole. Spurs of male pretarsus same in length 8
8. Abdominal segments with a horizontal row but bristles very obscure ..... *fusania* (Murayama)
- Each abdominal segment with a horizontal row of bristles 9
9. Dorsal surface lustrous. ..... *opaciventris* (Moser)
- Dorsal surface matted, velvety. 10
10. Body small, less than 8 mm. Basal margin of hind coxa with a row of bristles ..... *orientalis* (Motschulsky)
- Body medium size, more than 8 mm. Basal margin of hind coxa without bristle 11
11. Vertex without bristles ..... *infuscata* (Moser)

– Vertex with a horizontal line of bristles in the middle 12
12. Abdominal segments with dense hairs and a conspicuous row of bristles .....
..... *cariniceps* (Moser)
– Abdominal segments with scattered hairs and an inconspicuous row of bristles. .....
..... *laboriosa* (Brenske)
13. Body medium sized (8–10 mm). Antennal club of male as long as stalk 14
– Body small (less than 7.5 mm). Antennal club of male longer than stalk 15
14. Vertex with a few bristles. Antennal club of male as long as stalk ..... *verticalis* (Fairmaire)
– Vertex with distinct a horizontal row of bristles. Antennal club of male shorter than stalk .....
..... *castanea koreana* subsp. nov.
15. Body bright brown to reddish brown. Vertex pearled shining. Dorsal surface with few setae ..... *ovatula* (Fairmaire)
– Body yellow almost golden-colored. Vertex velvety. Dorsal surface with scattered yellowish setae ..... *aureola* (Murayama)

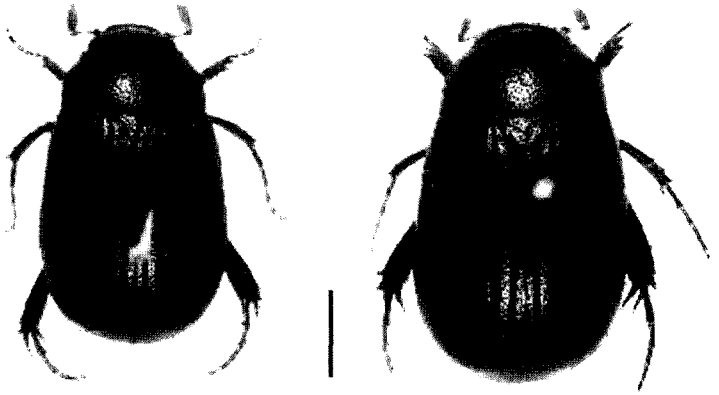
Maladera coreana Kim et Kim, sp. nov. 한국우단풍뎅이 (신칭)

(Figs. 1, 2)

Maladera nitidiceps: Stebnicka, 1980. Acta Zool. Cracov. 24(5): 258–260 (Korea: Pyeongyang, Hyeoisan) (misidentification).

Diagnosis. Body oval, reddish brown (=coppery) to dark brown. Dorsal surface metalic shining. Head somewhat wide. Clypeus, vertex, abdominal surface and pygidium with dense hairs and bristles. (L): 8.0–9.0 mm, (W): 4.5–5.3 mm.

Description of male. Head. Clypeus dark brown, wide and short, largely punctuated with scattered setae on surface. Vertex dark brown with large punctuations and some hair. Antenna 10-segmented with 3-segmented club. Antennal club is same length as stalk. Thorax. Pronotum wide and almost twice its length, covered with deep punctuations on surface. Scutellum triangular with dense punctuations same as that of pronotum, making rows on the groove and interspace with distinct lines. Interspace between mid coxae wider than the interspace between femurs. Perpendicular line in the middle base of metasternum with bristles on both sides. Hind coxa with somewhat large punctuations and perpendicular bristles on both



♂ ♀

Fig. 1. *Maladera coreana* sp. nov. (—— : 2 mm).

sides. Mid-tibia short. Hind tibia short, wide and wrinkled by punctuations and setae. Elytra. The second interspace wide with scattered setae; deep punctuations over surface with remarkable perpendicular lines. Abdomen. Surface matted. Each abdominal sternite with horizontal row of bristles; median margin somewhat elevated toward frontal side. Beneath the margin of compound eyes with scale-like slice. Pygidium. Flat, triangular, and velvety without shining. Surface hairy and punctuation with fine hair. Aedeagus. Middle piece flat, oval shaped, cylindrical, and convex at base. End of middle piece asymmetrical; right side longer than the left convex with severely rugged part. Left paramere wide, short and feebly curved toward outside with small protrusion at the end of left side. Right paramere small and lightly attached at the end of middle piece. Female. Nearly same shape with male, but different by having short antennal club and convex abdomen.

Type series. Holotype. Seoul: Gye-dong, Jongno-gu (♂, 8 VI 1989, JJ Moon). Paratypes. GG: Mt. Soyosan (♂, 24 VI 1986, YH Kim), Mt. Jeongbalsan, Ilsan (♀, 13 VI 2000, DH Song), Suwon (♀, 20 V 1970, Bs), Mt. Dobongsan, Wui-dong (♂, 30 IV 1998, TH Kang), Campus of Sungshin Women's University, Dongseon-dong, Sungbuk-gu (♂♀, 11-20 VI 2001, AY Kim), Mt. Gaewunsan, Anam (♀, 21 VI 1999, EK Min), Yongsan (♂, 14 IV 1996, KH Kim), Mt. Gwanaksan, Gwanak-gu (♀, 1 IX 1993, SK Lee), Garyeon-dong, Eunpyng-gu (♀, 19 V 1988, EJ Park), Seoneung (♀, 1 VIII ?, EH Yang); CN: Mt. Gyeryongsan (♂, 7 VI 1997, MS Lee), Tem. Gapsa (♀, 29 VII 1979, SH Nam); GN: Daeil-myeon, Hapcheun-gun (♀, 23 VIII 1984, SS Kim); JB: Mt. Dukyusan (♀, 23 VII 1990, KH Rim); JN: Is. Odongdo, Yeosu-si (3 ♂, 8-9 VIII 1994, YS Kim). The type series are kept in the collection of Animal Science, Sungshin Women's University.

Distribution. Korea.

Remarks. This species was reported as *M. nitidiceps* Nomura at first by Stebnicka (1980) from northern part of the Korean peninsula. However, the morphological characteristics and aedeagus described by her do not agree with those from the voucher specimen that was identified as *M. nitidiceps* (Ishigaki Nakasugi, 27 V 92) by Kobayashi from Japan. Therefore, the species observed by Stebnicka (1980) was not *M. nitidiceps*. On the other hand, among the specimens which have been treated as *M. cariniceps*, we recognized some of which are identical to Stebnicka's description (1980). Even though we could not found the three specimens from Stebnicka (1980), the description and illustrations are identical to the specimens that we have. Therefore, we describe this as new to science.

Maladera renardi (Ballion, 1870) 레나아드우단풍뎅이

(Fig. 3)

Serica renardi Ballion, 1870, Bull. Soc. Nat. Hist. Moscou. XLIII: 339 (TL: E. Siberia); Murayama, 1935: 2; 1937: 33; 1938b: 11; 1941: 19; 1954: 54; Sawada, 1937: 9; Cho, 1969: 657; Kim and Kim, 1972a: 84; Kim and Nam, 1982: 154.

Serica motschulskyi Brenske, 1897, Ber. Ent. Zeit XLII (III/IV): 370 (TL: Corea); Niijima and Kinoshita, 1923: 22; Kato, 1935: 112; Murayama, 1937: 43; 1938b: 11; 1954: 58; Sawada, 1937: 9; Mochizuki and Tsunekawa, 1937: 93; Miwa and Chujo, 1939: 53; Cho, 1957: 295; 1969: 658; Kim and Kim, 1972a: 53; Kim and Nam, 1982: 155.

Serica spissigrada Brenske, 1897, Ber. Ent. Zeit XLII (III/IV): 3; Niijima and Kinoshita, 1923: 23; Sawada, 1937: 29; Murayama, 1938b: 12; 1941: 19; 1954: 40; Nomura, 1967: 52; KZS, 1968: 136; Cho, 1969: 652; Kim and Nam, 1982: 154.

Serica nakayamai Murayama, 1938b, Nippon Kakujutsukyokaiho 13(2): 16; 1941: 19; 1954: 57; Cho, 1969: 658; Kim and Kim, 1972a: 83; Kim and Nam, 1982: 155.

Maladera renardi: Miwa and Chûjô. 1939: 55; Cho, 1957: 296; KZS, 1968: 136; Kim, 1983: 83; Kim and Lee, 1991: 67; Kim, 1992: 105; Bae and Moon, 1993: 147; Kim *et al.*, 1994: 111; Kim and Kim, 1997: 123; 1998: 170; Kim, 2001: 68.

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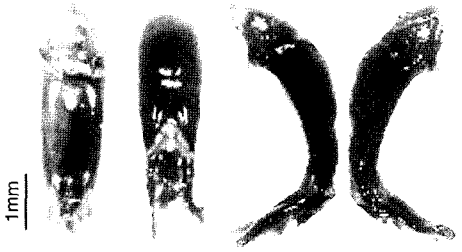

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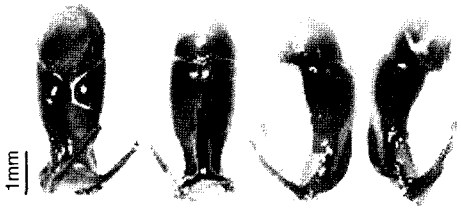

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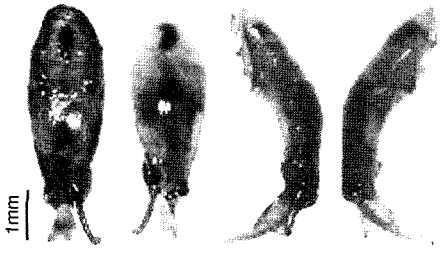

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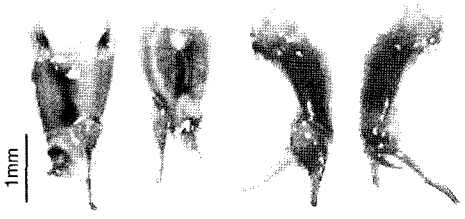

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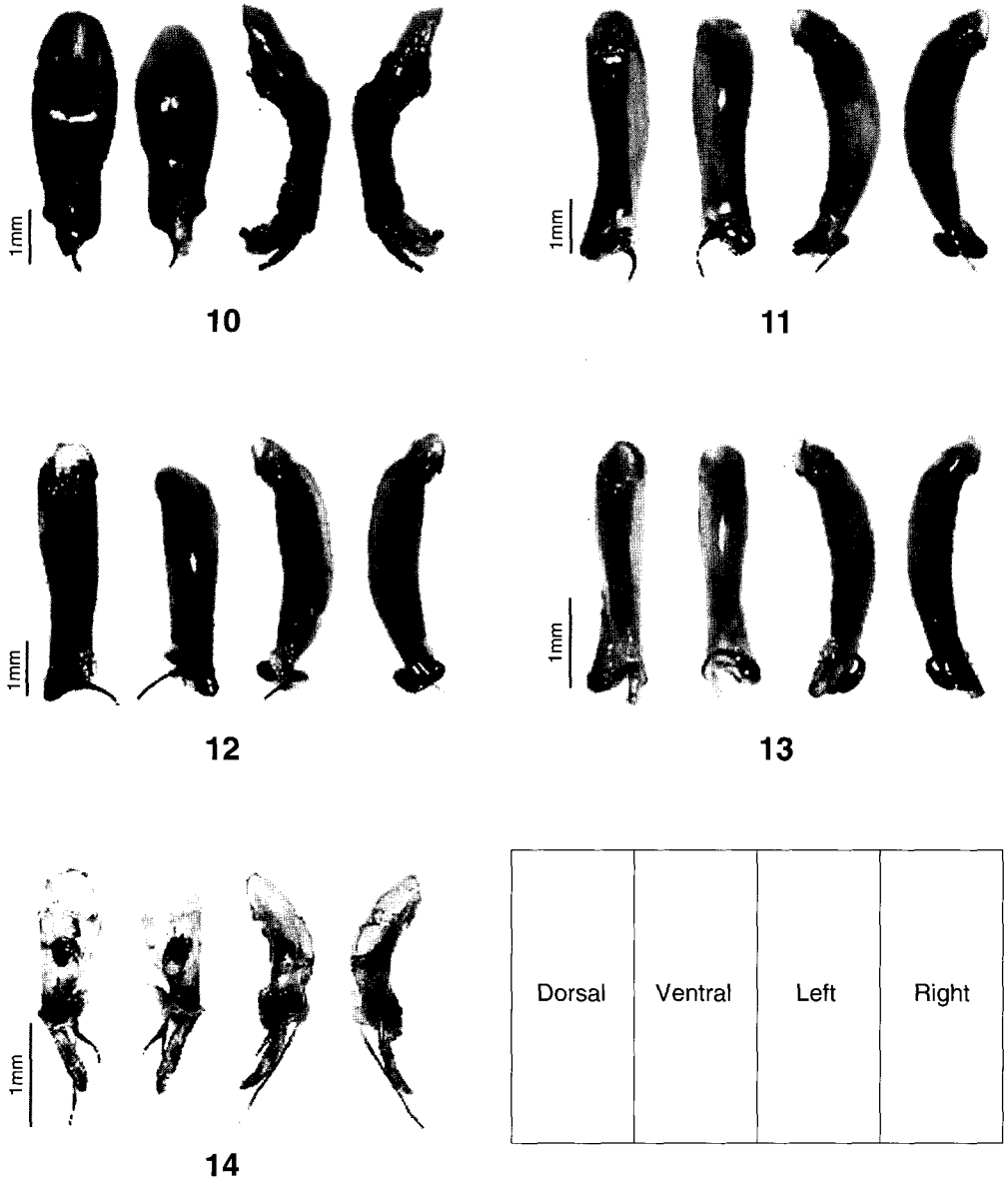

Figs. 2–14. Male aedeagus of *Maladera*. 2. *M. coreana* sp. nov.; 3. *M. renardi* (Ballion); 4. *M. holosericea* (Scopoli); 5. *M. Schoenfeldti* (Murayama); 6. *M. gibbiventris* (Brenske); 7. *M. okamotoi* (Murayama); 8. *M. fusania* (Murayama); 9. *M. orientalis* (Motschulsky); 10. *M. cariniceps* (Moser); 11. *M. verticalis* (Fairmaire); 12. *M. castanea koreana* subsp. nov.; 13. *M. ovatula* (Fairmaire); 14. *M. aureola* (Murayama).

Maladera spissigrada: Miwa and Chûjô, 1939: 55; Cho, 1957: 296; Kim, 1981: 344.
Maladera (M.) renardi: Nomura, 1967: 52; Nomura, 1973: 128; Stebnicka, 1980: 254.

Size. (L) 7.0–9.5 mm, (W) 4.5–5.5 mm.
Material examined. 60 specimens from GW, GG, CN, GB, GN, and JN.

Distribution. Korea, China (Manchuria), Japan, Russia (E. Siberia.)

Maladera holosericea (Scopoli, 1772) 홀쭉우단풍뎅이

(Fig. 4)

Scarabaeus holosericea Scopoli, 1772, Ann. Hist. Nat. V: 77

Serica holosericea: Murayama, 1935: 2; 1937: 33; Sawada, 1937: 9; Murayama, 1938b: 10; 1941: 19; 1954: 52; Cho, 1969: 656; Kim and Kim, 1974: 229.

Maladera holosericea: Sawada, 1937: 9; Murayama, 1938a: 264; Miwa and Chûjô, 1939: 54; KZS, 1968: 136; Kim and Yoo, 1987: 505; Kim and Lee, 1991: 67; Kim, 1992: 105; ESK & KSAE, 1994: 151; Kim and Kim, 1996: 127; Kim, 1997: 122; Kim, 2001: 69.

Maladera holoserica [*sic*]: Cho, 1957: 296.

Maladera (*M.*) *holosericea*: Stebnicka, 1980: 255.

Serica holoserica [*sic*]: Kim and Nam, 1982: 154.

Size. (L) 7.0–8.0 mm, (W) 4.0–5.0 mm.

Material examined. 59 specimens from GW, GG, CB, CN, GB, JB, and JN.

Distribution. Korea, China (Manchuria), Russia (Amur, Siberia), Caucasus, Europe.

Remark. In females, they are especially similar to *M. schoenfeldti*, but have distinct hind tibia with obscure perpendicular groove and hind femur with a row of bristles on the inner side.

Maladera shoenfeldti (Murayama, 1937) 스웬펠드트우단풍뎅이

(Fig. 5)

Serica schonfeldti Murayama, 1937, Journ. Chosen Nat. Hist. Soc. 22: 37 (TL: Korea–Hamheung, Chungryang–ri, Hyoegi–dong, Gyesung); Murayama, 1938a: 11; 1938b: 264; 1954: 56; Cho, 1957: 295; 1969: 657.

Serica schoenfeldti: Miwa and Chujo, 1939: 54; Cho, 1957: 295; Kim and Nam, 1982: 154.

Maladera (*M.*) *schonfeldti*: Stebnicka, 1980: 258.

Maladera schonfeldti: Kim and Lee, 1991: 67; ESK & KSAE, 1994: 151; Kim and Kim, 1997: 123.

Maladera schoenfeldti: Kim, 2001: 70.

Size. (L) 7.0–9.5 mm, (W) 4.3–5.0 mm.

Material examined. 69 specimens from GW, GG, CB, CN, GB, GN, JB, and JN.

Distribution. Korea.

Maladera gibbiventris (Brenske, 1897) 주름배우단풍뎅이

(Fig. 6)

Autoserica gibbiventris Brenske, 1897. Ber. Ent. Zeit., XLII(III/IV): 396, 401 (TL: China); Niijima and Kinoshita, 1927: 9; Maruta, 1929: 367.

Aserica gibbiventris: Murayama, 1935: 3; Murayama, 1938a: 12; Miwa and Chujo, 1939: 56; Nakayama and Okamoto, 1940: 198; Cho, 1957: 296; KZS, 1968: 136.

Serica gibbiventris: Murayama, 1954: 36; Cho, 1969: 652; Kim and Kim, 1974: 107; Kim and Nam, 1982: 154.

Maladera (*M.*) *gibbiventris*: Stebnicka, 1980: 254.

Maladera gibbiventris: Nomura, 1974: 109; Kim and Lee, 1991: 67; Kim, 1992: 105; Kim *et al.*, 1994: 111; ESK & KSAE, 1994: 151; Kim and Kim, 1997: 126; 1998: 129; Kim, 2001: 74.

Size. (L) 9.0–12.0 mm, (W) 5.6–7.2 mm.

Material examined. 77 specimens from GW, GG, CB, GB, GN, JB, and JN.

Distribution. Korea, China (Central), Taiwan.

Maladera okamotoi (Murayama, 1938) 오카모토우단풍뎅이

(Fig. 7)

Aserica okamotoi Murayama, 1938a. Annot. Zool. Japon 17(1): 18 (TL: Korea).
Serica okamotoi: Murayama, 1954: 35; Cho, 1969: 651; Kim *et al.*, 1974: 229.
Maladera (M.) okamotoi: Stebnicka, 1980: 258.
Maladera okamotoi: Kim and Lee, 1991: 67; Kim, 1992: 105; ESK & KSAE, 1994: 151; Kim *et al.*, 1995: 171; Kim and Kim, 1997: 126; Kim, 2001: 76.

Size. (L) 8.0–10.5 mm, (W) 5.0–6.5 mm.
Material examined. 85 specimens from GW, GG, CB, CN, GB, GN, JB, and JN.
Distribution. Korea, China (青島).

Maladera fusania (Murayama, 1934) 부산우단풍뎅이

(Fig. 8)

Aserica fusania Murayama, 1934, Journ. Chosen Nat. Hist. Soc. 19: 35 (TL: Korea– Pusan); 1935: 3; 1938a: 13; Miwa and Chujo, 1939: 56; Cho, 1957: 296; KZS, 1968: 136.
Maladera cariniceps cariniceps: Nomura, 1967: 52.
Serica fusania: Murayama, 1954: 38; Cho, 1969: 652; Kim and Kim, 1972a: 84.
Maladera (M.) fusania: Stebnicka, 1980: 255.
Maladera fusania: Cho, 1957: 296; Nomura, 1974: 107; Kim and Lee, 1991b: 67; Kim and Park, 1991: 192; ESK & KSAE, 1994: 151; Kim and Kim., 1997: 125; Kim, 2001: 76.

Size. (L) 7.5–9.5 mm, (W) 5.0–6.0 mm.
Material examined. More than 140 specimens from GW, GG, CB, CN, GB, GN, JB, and JN.
Distribution. Korea, Taiwan.

Maladera opaciventris (Moser, 1915) 아래검은우단풍뎅이

Autoserica opaciventris Moser, 1915, Deut. Ent. Zeit.: 355 (TL: Korea–Seoul); Niijima and Kinoshita, 1923: 29.
Aserica opaciventris: Winkler, 1925: 1071; Murayama, 1938a: 12; Miwa and Chujo, 1939: 57; Cho, 1957: 297; KZS, 1968: 136.
Serica opaciventris: Murayama, 1954: 26 (Korea–Youngju); Cho, 1969: 649; Kim and Kim, 1972: 83; Kim and Nam, 1982: 154.
Maladera (M.) opaciventris: Stebnicka, 1980: 207.
Maladera opaciventris: Kim and Yoo, 1987: 505; Kim and Lee, 1997: 129; Kim, 2001: 65.
Serica opaeiventris [sic]; Lee *et al.*, 1994: 147.

Size. (L) 8.8 mm, (W) 5.0–5.5 mm.
Material examined. None.
Record. Korea (Seoul, Youngju).
Remarks. Moser (1915) described this as new species from Korea, and Murayama (1954) reported it with one female specimen. Other papers just cited these two records. Therefore, comparison between the type specimen and the specimen from the Murayama collection will be helpful for further study.

Maladera orientalis (Motschulsky, 1857) 애우단풍뎅이

(Fig. 9)

Serica orientalis Motschulsky, 1857, Etud. Ent., VI: 33; Kolbe, 1886: 192 (Korea); Heyden, 1887: 251; Niijima and Kinoshita, 1923: 21; Okamoto, 1924: 172; Nakayama, 1929: 266; Murayama, 1931: 20; Tomiura, 1935: 238; Masaki, 1936: 261; Mochizuki and Twunekawa, 1937: 93; Mori *et al.*, 1937: 93;

Sawada, 1937: 25; Murayama, 1938a: 10; 1938b: 259; Miwa and Chujo, 1939: 53; Nakayama and Okamoto, 1940: 200; Takahashi, 1941: 228; Murayama, 1941: 18; 1954: 48; Cho, 1957: 295; 1963: 217; 1967: 197; 1968: 264; 1969: 655; Kim and Kim, 1972: 84; 1972b: 196; 1974: 107; Kim and Nam, 1982: 154; Kim *et al.*, 1984: 328; Lee *et al.*, 1985: 421.

Aserica orientalis: Reitter, 1902 :145.

Maladera orientalis: Dalla Torre, 1912: 18; Winkler, 1925: 1070; Wu, 1936: 1016; Nomura, 1960: 58; Nomura, 1969: 79; Kim, 1981: 344; Kim *et al.*, 1982: 276; Kim *et al.*, 1987a: 104; 1987b: 505; Kim and Yoo, 1987: 505; Kim, 1989: 365; Kim and Lee, 1991: 67; Kim *et al.*, 1991: 179; Kim, 1992: 105; Park *et al.*, 1993: 178; Kim *et al.*, 1994: 111; 1995: 455; 1997b: 124; 1998: 129; Kim, 2000: 132; 2001; 71.

Serica salebrosa: Masaki, 1936: 261.

Maladera (M.) orientalis: Stebnicka, 1980: 257.

Size. (L) 7.0–8.0 mm, (W) 4.5–5.0 mm.

Material examined. More than 430 specimens from GW, GG, CB, CN, GB, GN, JB, and JN.

Distribution. Korea, China (Manchuria), Mongolia, Taiwan, Japan, Russia (Siberia).

Remarks. This species is univoltine, it is active from the end of April to June, and hibernates as adult (Liu *et al.*, 1997).

Maladera infuscata (Moser), 1915 그을음우단풍뎅이

Autoserica infuscata Moser, 1915, Deut. Ent. Zeit.: 340 (TL: Korea, China); Niijima and Kinoshita, 1923: 29; Niijima and Kinoshita, 1927: 6; Tomiura *et al.*, 1935: 239; Murayama, 1935: 329; Kondo, 1941: 70.

Aserica infuscata: Murayama, 1938b: 13; Miwa and Chujo, 1939: 56; Cho, 1957: 297; KZS, 1968: 136.

Serica infuscata: Murayama, 1954 (Korea–Wangsimri): 41; Cho, 1969: 653; Kim and Nam, 1982a: 154.)

Maladera (A.) infuscata: Nomura, 1960: 58.

Maladera infuscata: Nomura, 1974: 104; Stebnicka, 1980: 207; ESK & KSAE, 1994: 151; Kim *et al.*, 1997b: 122; Kim, 2001: 74.

Size. (L) 9.0–10.5 mm, (W) 5.5–6.5 mm.

Records. Seoul: Wangsimri, GB: Goryeong, GN: Dongrae, JN: Mokpo (Murayama, 1954).

Material examined. None.

Distribution. Korea, Taiwan, China (Central), Japan (Tsushima Is.).

Maladera cariniceps (Moser, 1915) 알모양우단풍뎅이

(Fig. 10)

Autoserica cariniceps Moser, 1915, Deut. Ent. Zeit.: 341 (TL: Korea–Seoul); Niijima and Kinoshita, 1923: 238; 1927: 7.

Aserica cariniceps: Winkler, 1925: 1070; Murayama, 1938b: 13; Miwa and Chujo, 1939: 55; Cho, 1957: 296; KZS, 1968: 136.

Serica cariniceps: Murayama, 1954: 41; Cho, 1969: 653; Kim and Nam, 1982: 155.

Aserica fusania: Nomura, 1967: 52.

Maladera (Aserica) cariniceps: Nomura, 1967: 52.

Maladera (M.) cariniceps: Nomura, 1973: 133; Stebnicka, 1980: 255.

Maladera cariniceps: Kobayashi *et al.*, 1989: 309; Kim and Lee, 1991: 67; Kim, 1992: 105; ESK & KSAE, 1994: 151; Kim *et al.*, 1997b: 124; Kim, 2001: 72.

Size. (L) 8.0–10.2 mm, (W) 5.0–6.5 mm.

Material examined. More than 180 specimens from GW, GG, CB, CN, GB, JB, and JN.

Distribution. Korea, China (Manchuria), Japan.

Remarks. It has been confused with *M. fusania*, which also has a row of bristles on the vertex, but dense hairs and horizontal bristles on abdominal sternites are distinct from those of *M. fusania*.

Maladera laboriosa (Brenske, 1897) 대남우단풍뎅이

Autoserica laboriosa Brenske, 1897, Ber. Ent. Zeit. XLII(III/IV): 399 (TL: China).
Aserica laboriosa: Miwa and Chujo, 1939: 57; Cho, 1957: 297.
Serica laboriosa: Murayama, 1938: 12; 1954: 43; Cho, 1969: 654.

Material examined. Seoul (Seoul, 3♀)-Brenske's Collection from Berlin Museum.
Distribution. Korea, China
Remarks. This species was eliminated from the Korean fauna by Kim and Lee (1998). But we could get three specimens from the Berlin Museum in German. All of the specimens are females and very similar to *M. fusania*. However, comparison with females is sometimes quite difficult to distinguish between species in Sericinae. We consider that there are possibilities to find some differences between them when compared with males or other characters. Therefore, further study is required.

Maladera verticalis (Fairmaire, 1888) 빨간색우단풍뎅이

(Fig. 11)

Serica verticalis Fairmaire, 1888, Rev. d'Ent., VII: 118 (TL: China); Murayama, 1954: 59; Cho, 1969: 659; Kim and Kim, 1974: 107; Kim and Nam, 1982: 155; Kim, 1981: 344.
Aserica verticalis: Murayama, 1935a: 3; Murayama, 1938a: 14; Miwa and Chujo, 1939: 58; Murayama, 1941: 20; Cho, 1957: 297; KZS, 1968: 136.
Maladera (M.) verticalis: Stebnicka, 1980: 207.
Maladera verticalis: Kim *et al.*, 1991: 179; Kim and Lee, 1991: 67; Kim *et al.*, 1991: 169; Kim and Park, 1991: 192; Kim, 1992: 105; 1992: 153; Kim, 1995: 174; Kim and Kim, 1996: 127; Kim and Kim, 1997: 170; Kim *et al.*, 1998: 129; Kim, 2000: 132; 2001: 66.

Size. (L) 8.0-9.5 mm, (W) 4.3-6.0 mm.
Material examined. More than 420 specimens from HB, GW, GG, CB, CN, GB, GN, JB, JN, and JJ.
Distribution. Korea, China (Manchuria), Mongolia.
Remarks. This species is univoltine and hibernates as larva. Adults emerge in the end of June and are active till July (Liu *et al.*, 1997).

Maladera castanea koreana Kim et Kim, subsp. nov. 우리밤색우단풍뎅이 (신칭)

(Fig. 12)

Autoserica castanea: Cho, 1967: 198.
Aserica castanea: Eguti, 1932: 58; Murayama, 1935a: 3; 1937a: 1938b: 14 33; Miwa and Chujo, 1939: 55; Cho, 1947: 65; 1955: 163; 1957: 124.
Serica castanea: Murayama, 1954: 44.
Serica castanae [sic]: Cho, 1969: 654.
Maladera (M.) castanea: Stebnicka, 1980: 253.
Maladera castanea: Shin and Joo, 1977: 88; Nomura, 1969: 79; Yoon and Nam, 1980: 149; Kim and Nam, 1982: 129; Kim, 1983: 83; Kim *et al.*, 1984: 169; 1985: 105; Kim and Lee, 1991: 67; Park *et al.*, 1993: 178; Lee *et al.*, 1994: 147; ESK & KSAE, 1994: 151; Kim *et al.*, 1997b: 127; 1998: 170; Kim, 2001: 75.

Size. (L) 9.0-10.0 mm, (W) 5.0-6.0 mm.
Description. Body oval, reddish brown. Dorsal surface velvety, iridescent. Head. Clypeus narrowed anteriorly, shiny and densely punctuated. Clypeal suture triangular. Vertex velvety, sometimes with yellow bristles. Antenna yellowish brown, 10-segmented with 3-segmented club. Male antennal club slightly shorter than stalk and that of female short nearly half of stalk. Thorax. Pronotum wide almost twice of the length, lightly elevated in the middle, scattered punctuations on the surface with bristles at margin. Scutellum triangular with

scattered punctuations. Vertical line of elytra with a row of punctuations, interspaces with irregular punctuations. Quarter and half moon-like punctuations forming rows without any projections in the middle. Interspace with somewhat large constructions horizontally. Hind coxa lusterless with big punctuations and few bristles at sides. Foretibia shiny and pretarsus short as well as thick. Hind femur wide and lusterless, with a feeble rear vertical line. Hind tibia shiny and wider in the middle. Spur of hind tibia same as or slightly longer than the 1st tarsus. First hind tarsus with a vertical groove inner side and almost same length with adding the 2nd and 3rd tarsus. Abdomen. Pygidium wide triangle-like, slightly elevated in the middle, velvety with scattered punctuations. Abdominal sternites with dispersed punctuations and a row of bristles. Aedeagus. Middle piece like a long and narrow cylinder. End of right side slant. Base of upper paramere thick. End of lower paramere slightly divided.

Type series. Holotype. GB: Guryong-po (♂, 26 VII 1982, YS Yu) Paratype. GW: Jungsun-gun (2♂, 2-3 VIII 1996, IS Kim); GG: Mt. Yongmunsan (♂, 16 IX 1990, NY Kim), Gwangju (♂, 13 VIII 1976, OJ Lee), Is. Daechung-do (♂, 14 VI 1990, IY Han), Gosan-dong, Euijungbu-si (♂, 13 VIII 1992, EA Choi), Yongsan (♂, 13 VII 1975, KO Lee), Sanggye-dong (♂, 13 VI 1999, EH Cho); CB: Danyang (♂, 21 VII 1981, EY Lee), Mt. Sokrisan, Boeun (3♂, 6 VIII 1990, JI Kim); CN: Mt. Kwangduksan, Cheonan-gun (♂, 22-23 VII 1994, JM Park), Anmyun, Taean-gun (♂, 25 VII 1994, LR Kim), Mt. Mansusan, Buyeo-gun (♂, 19 VII 1999, JI Kim *et al.*); GB: Namdae-ri, Buseok-myeon, Youngju-si (♂, 1 VII 1998, JI Kim *et al.*), Mungyungsaejae (♂, 10 VII 1977, JW Lee); GN: Joongsan-ri, Mt. Jirisan (2♂, 30-31 VII 1981, JI Kim), Wungok, Hamyang-gun (♂, 24 VII anonymous; ♂, 22 VII 1985, anonymous), Nepo-ri, Wondong-myeon, Yangsan-gun (♂, 11-16 VIII 1987, anonymous), Chilchundo, Geojae-gun (4♂, 15-18 VIII 1985, JS Jeon), Daeyoung, Hapcheun (♂, 5 VII 1984, SS Kim); JN: Mt. Jirisan (♂, 19 VIII 1982, JI Kim; 2♂, 1-29 VIII 1998, TM Han), Mt. Baekwunsan, Gwangyang (♂, 10 VIII 1993, SY Kim). The type series are kept in the collection of Animal Science, Sungshin Women's University.

Other materials examined. GW: Gangchon (♂, 10 VII 1998, Cho); GG: Jangsu-dong, Nam-gu, Inchun-si (♂, 5 VII 1986, Park), Songhyun, Dong-gu, Inchun-si (♂, 29 VII 1993, Yim), Pocheun (♂, 5 VIII 1996, Kim); CN: Temp. Donghaksa, Mt. Gyeryongsan (♂, 28 VII 1979, Yoon), Temp. Kapsa (♂, 29 VII 1979, Yoon); GB: Kyungnam Univ., Buk-gu, Daegu (♂, 20 VI 1992, Park), Bonghwa-gun (2♂, 5 VIII 1998, Park), Mt. Ilwolsan (♂, 22 VII 1997, Cho); GN: Yeocha, Sangrim, Kimhe (♂, 15 VIII 1987, anonymous), Jinju-si (♂, 6 VII 1984, Oh), Mt. Bibongsan (♂, 27 VII 1984, Oh); JB: Namwon-gun (♂, 28 VII 1988, Kim).

Distribution. Korea.

Remark. External morphology of this species are very similar to *M. castanea* or *M. verticalis*. However, the aedeagus shows an intermediate form of them and the antennal club of male is shorter than the stalk. Nomura (1973) doubted for the distribution of *M. castanea* in Korea and China, but *M. castanea* is, in fact, widely distributed over palaearctic, oriental and nearctic (North American) regions. In the case of *M. verticalis*, its distribution is restricted to the oriental region (Korea, China (Manchuria), Mongolia). In shape of aedeagus, which is very crucial for identifying species in Sericinae, it seems that the paramere is closer to *M. castanea* than *M. verticalis*, and Korean *M. castanea* shows uniform shape of paramere. Therefore, we consider this as subspecies of *M. castanea*.

Maladera ovatula (Fairmaire, 1891) 차색우단풍뎅이

(Fig. 13)

Autoserica ovatula Fairmaire, 1891, Ann. Soc. Ent. Belg. XXXV, Compt. Rend.: 195; Niijima and Kinoshita, 1927: 5.

Aserica ovatula: Murayama, 1938a: 14; Miwa and Chujo, 1939: 57; Murayama, 1941: 20; Cho, 1957: 297; KZS, 1968: 136; Park and Han, 1992: 138.
Serica ovatula: Murayama, 1954: 64; Cho, 1969: 660; Kim *et al.*, 1974b: 108; Kim and Nam, 1982: 155.
Maladera (M.) ovatula: Stebnicka, 1980: 207.
Maladera ovatula: Kim, 1981: 344; Kim and Lee, 1989: 176; Yoon *et al.*, 1989: 140;
Kim and Lee, 1991: 67; Kim, 1992: 104; ESK & KSAE, 1994: 151; Kim *et al.*, 1994b: 111; 1996: 58; 1997b: 128; Kim, 2001: 67.

Size. (L) 7.0–8.0 mm, (W) 5.5–5.1 mm.
Material examined. 39 specimens from GW, GG, CN, GB, JB, and JN.
Distribution. Korea, Japan, China (Manchuria), Taiwan.
Remarks. M. ovatula is univoltine and hibernates as larva. Adults emerge in the beginning of June and are active till August (Liu *et al.*, 1997).

Maladera aureola (Murayama, 1938) 금색우단풍뎅이

(Fig. 14)

Aserica aureola Murayama, 1938, Annot. Zool. Jap. 17(1): 19 (TL: S. & C. Korea).
Serica aureola: Murayama, 1954: 64; Cho, 1969: 661; Kim and Nam, 1982: 155.
Maladera (M.) aureola: Stebnicka, 1980: 207.
Maladera aureola: Kim and Lee, 1991: 67; 1997b: 128: Kim, 2001: 65.

Size. (L) 7.0–8.7 mm, (W) 4.0–5.6 mm.
Material examined. 15 specimens from GW, GG, GN, and JN.
Distribution. Korea, Taiwan.

* Eliminated species from the Korean fauna

1. *Maladera formosae* (Brenske) Ber. Ent. Zeit. 1898: 210 (*Autoserica*, Taiwan)

This was recorded by Niijima and Kinoshita (1923) as a Korean. However, because of the characteristics described by them –hairs and blackish spots over elytra, and the long (nearly 2 to 3 times longer than stalk) antennal club, it is closer to *Serica* than *Maladera*. It is hard to recognize the species by such short description. Furthermore, other records of the Korean fauna (Murayama, 1937; Cho, 1969; Stebnicka, 1980 and so on) were based on the record by Niijima and Kinoshita (1923). Therefore, we exclude this from the Korean fauna.

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